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THE CROPPING CHARACTERIZATION OF SOILS FROM VLADAIA LOCALITY, DISTRICT MEHEDINTI

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Key words : soil profile, reddish preluvisoil, humus, pH, fertility, bonitation marks, favorability classes, fertility, reclaiming measures

ABSTRACT

The cropping characterization of soils is an operation of research for evaluating the fertility and suitability of soils for different crops and establishing the measures for their improving. In this respect, after field research and laboratory analyses there was identified as soil type the reddish preluvisoil with the following divisions: typical, middle eroded, luvic and, on small scale, aluvisoils with colluvic and gleysated divisions.

The laboratory analyses have emphasized an average and reduced fertility of these soils which can be improved through rational fertilization measures including fertilizers and manure, by special soil management practices for slope terrains, by amendment application, deep tillages and removing stagnant water.

The choosing of the most appropriate crops are a measure of improving these soils and that is why by bonitation there was established the suitability of several crops and ways of using of these soils. This way, on the typical preluvisoil the choose of crops include cereals and orchards due to their good results, while on eroded preluvisoil the most appropriate crop is vine, orchards (apricot tree) and pastures; these crops have obtained the highest bonitation marks (72, 65 and 46). The reddish luvic preluvisoil offers good conditions for pastures (64 points), wheat and barley (58 points) while on alluvisoil and colluvic glaysated alluvisoil the highest bonitation marks and growing conditions have been given by sugarbeet (63 points), hayfields (63 points) and pastures (64 points).

INTRODUCTION

The soil is a complex biological system home of endless life processes and transformations. By its mineral composition and processes during a long period of time the soil has gained its fundamental feature called fertility which is the ability to grow crops and to give yields.

Due to the fact that the land is limited as surface and the populace is continuing growing, nowadays there is focused the aspect of rational use of soil as source of raw materials and food as well as on increasing the yields by introducing in culture of the most productive and resistant crop kinds and hybrids closely correlated with the knowing of soil properties, of the factors that action positively or negatively on them as well as the way we can change the soil as a bio dynamic system in order to obtain higher yields and of better quality. All these facts are imposed by the fact that the soil, as shallow layer of Earth that has been continuously changed by the action of natural factors in specific conditions of geographic environment which it belongs is the natural environment where the roots grow allowing the access of water and nutrients for the plants in a continuous and uninterrupted way.

Begining with these aspects there was made a pedological study in the S-E part of Mehedinti District, in Vladaia locality in order to identify the main soil units and on the basis of their physical and chemical features to establish the plan of fertilization by bonitation operation as well as the suitability of certain crops.

MATERIALS AND METHODS

The soil research has been made both in field and in laboratory according with the recommendations of the Institute for Pedology and Agrochemistry Bucharest.

For the identification of the soil types within the researched area and for their morphological description there were made soil profiles dug till the bedrock. There were described the main morphological features as: the thickness of horizons, their succession, the color, the texture, the structure, the porosity, the compactness, neo formations and inclusions for each horizon. From all soil profiles there were taken soil samples for laboratory analyses, including the size of particles, the structure, hydro physical parameters, and chemical parameters.

On the basis of the properties that were determined and in function of natural factors there has been made the bonitation operation in natural conditions.

RESEARCH RESULTS AND DISCUSSIONS

On the territory of Vladaia locality, District Mehedinti, after field researches and laboratory analyses there was identified as main soil unit the reddish preluvisoil with several vaieties: typical, eroded, luvic and on smaller surfaces, gleysated colluvic aluvisoil.

Within the paper there will be presented the physical and chemical parameters of preluvisoil from plain or low declined terrains, with a good drainage, of aluvisoil and the the bonitation marks and the suitability classes for all soil types that were identified within the researched area.

Making an interpretation of the resulted data on the size of soil particles (figure 1) there results that the soil has an average clay content that increases from 33.4% in Ao to 43.7% in Bt2. The bulk density increases from 1.39 g/cm^3 in Ao till 1.56 g/cm^3 in Bt2. The soil density has the extreme value of 2.65 g/cm^3 in Ao and 2.70 g/cm^3 Cca. The total porosity decreases from 48% till 42% which indicates a compacted soil in deeper horizons (figure 2).

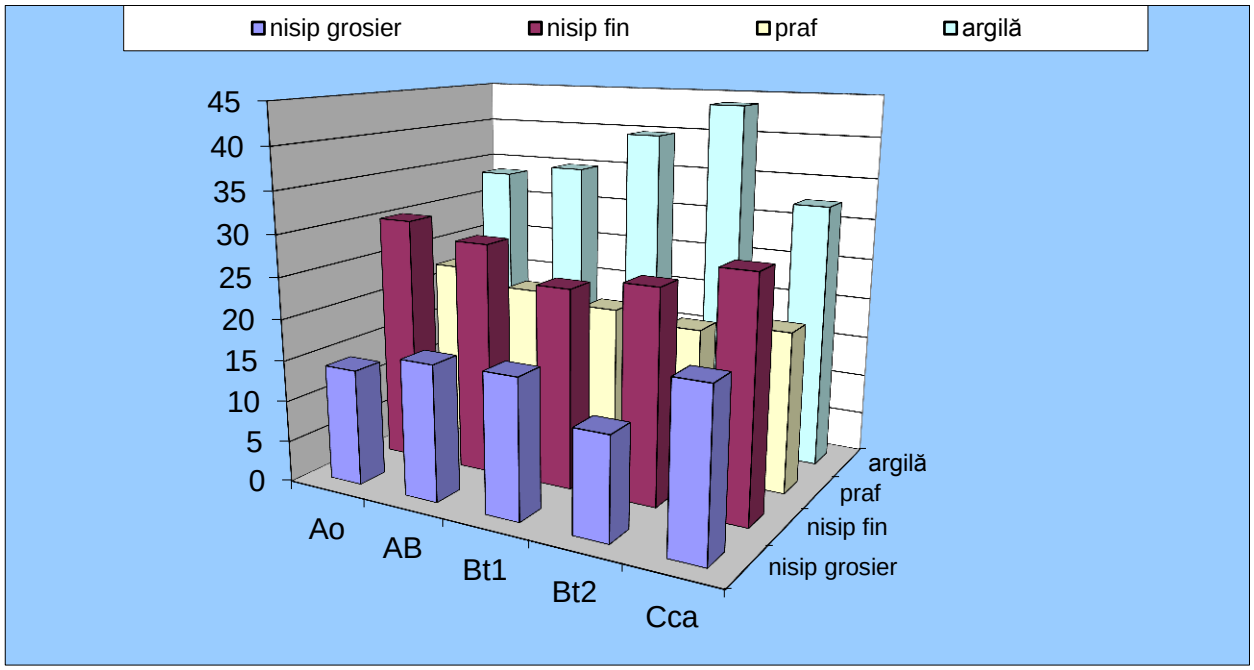


Figure 1. The size composition of reddish preluvisoil

The hydro physical parameters of preluvisoil have average values that perfectly correlate with the clay and humus contents and increase till surface at Bt2 horizon where they reach maximal values (figure 3).

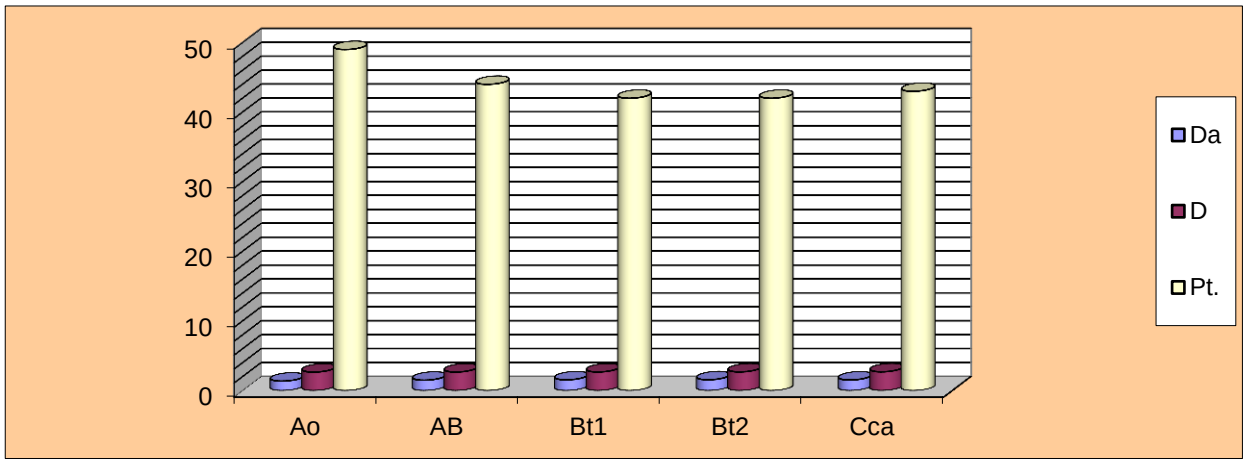
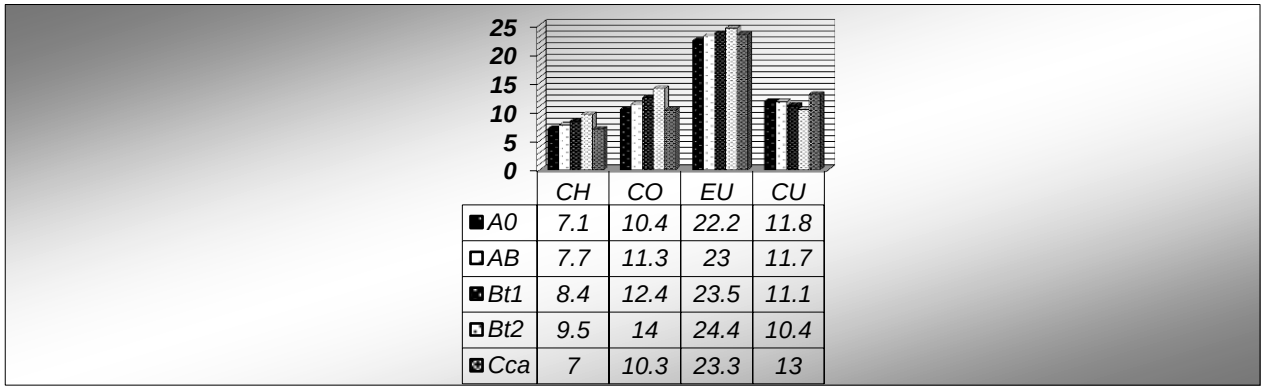


Figure 2. The hydro physical parameters of reddish preluvisoil



	CH	CO	EU	CU
A0	7.1	10.4	22.2	11.8
AB	7.7	11.3	23	11.7
Bt1	8.4	12.4	23.5	11.1
Bt2	9.5	14	24.4	10.4
Cca	7	10.3	23.3	13

Figure 3. The hydro physical features of reddish preluvisoil

After determination of chemical parameters there resulted that the soil is average supplied by humus (figure 4), low supplied by total N and average supplied by soluble P and K (figure 5). The reaction is low acid, pH=6 in Ao horizon (figure 4).

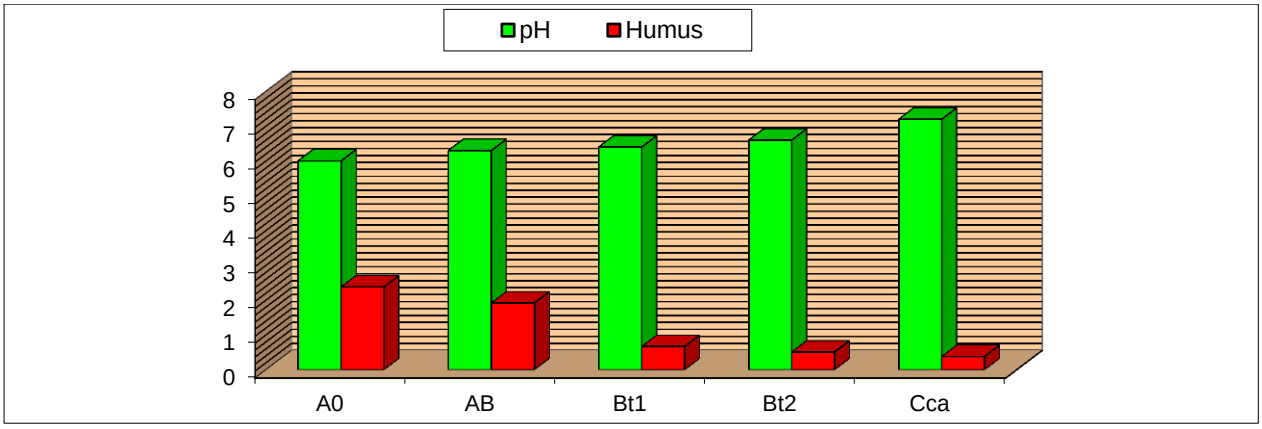


Figure 4. The humus content and pH of reddish preluvisoil

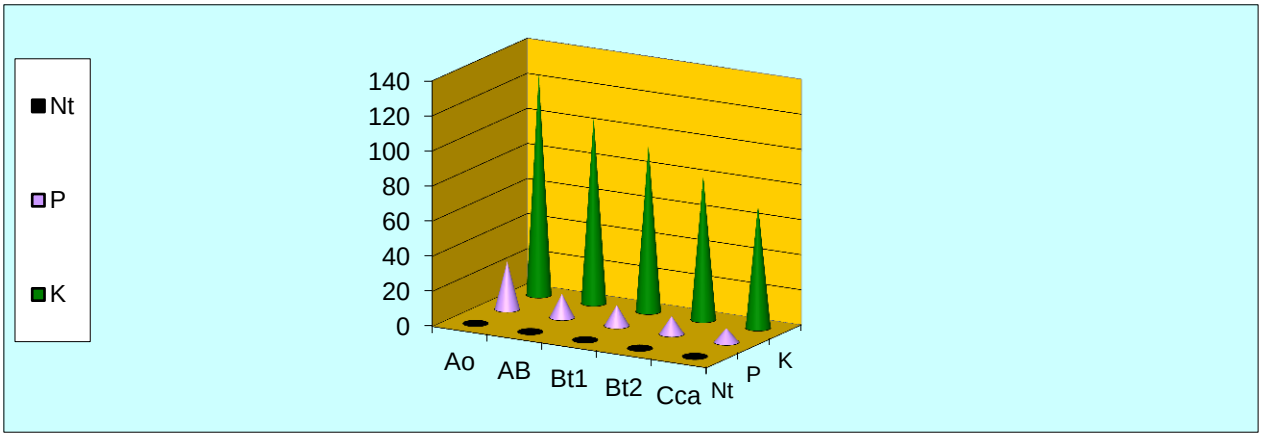


Figure 5. The content of nutrients of reddish preluvisoil

With the colluvisoil, that is found at the base of versants, where the eroded material was deposited by water from versants (colluvium), where the ground water is at low depth, has determined gleysation processes at the base of the profile, the size fractions have variable values on the soil profile. The thick sand is 4.5% in Ao horizon and in CGo it is 3.8%. With the case of fine sand there was recorded a decrease on soil profile, from 49.8% in A to 41.9% in AC, then it increases to 44.9% in CGo horizon. The loam decreases on the soil profile from 21.1% in Ao to 17.9% in CGo. The clay content increases on the soil profile from 24.6% in Ao to 33.4% in CGo (figure 6).

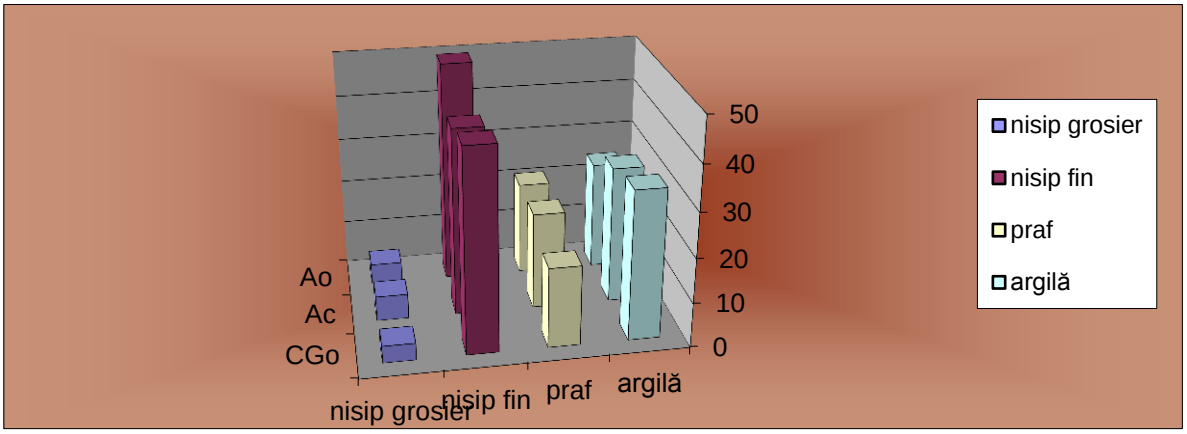


Figure6. The size composition of gleysated colluvic aluvisoil

The Hygroscopicity Coefficient increases on the soil profile from 7.1% in Ao horizon to 10.4% in CGo. The Wilting Point increases, too, along with the depth, from 10.4% in the first horizon to 15.3% in CGo. The Moisture Equivalent increases, too, from 23.5% in the first horizon to 28.4% in CGo horizon. The Available Water Capacity decreases from 11.5% in the first horizon to 9.5% in CGo horizon (figure 7).

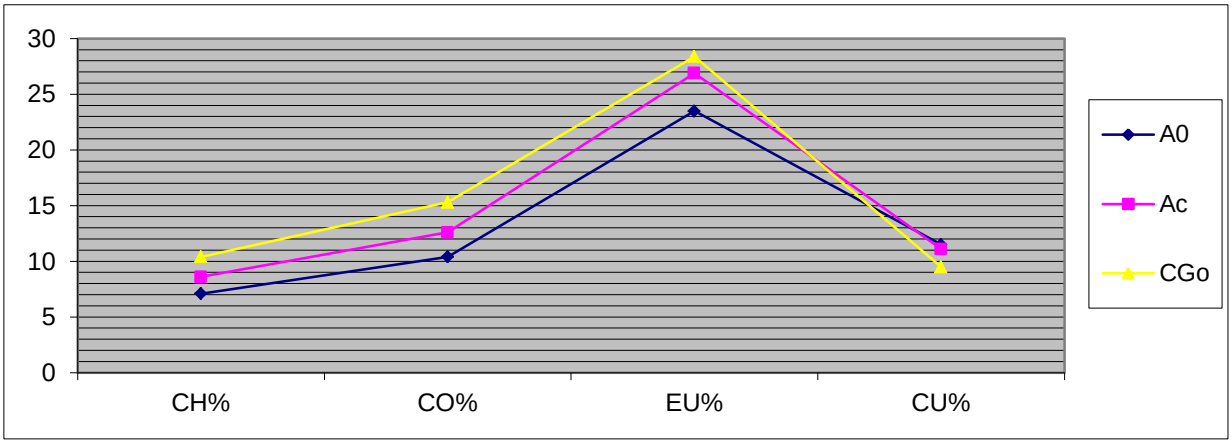


Figure7. The hydro physical parameters of gleysated colluvic aluvisoil

The humus content decreases with the depth of the soil profile from 2.6% in the first horizon to 1% in CGo horizon (figure 8) and the total nitrogen, from 0.13% to 0.45%. the phosphorus decreases, too, from 20.93 ppm to 15.26 ppm. The potassium decreases, too, from 96.28 ppm to 86.32 ppm (figure 9). The pH has values over 6, so, the reaction is low acid (figure 8).

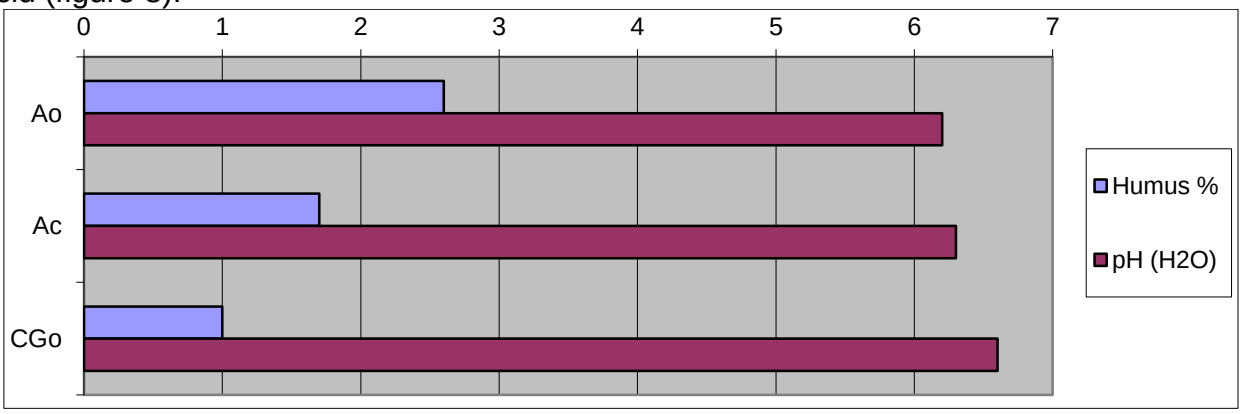


Figure 8. The humus content and pH values of gleysated colluvic aluvisoil

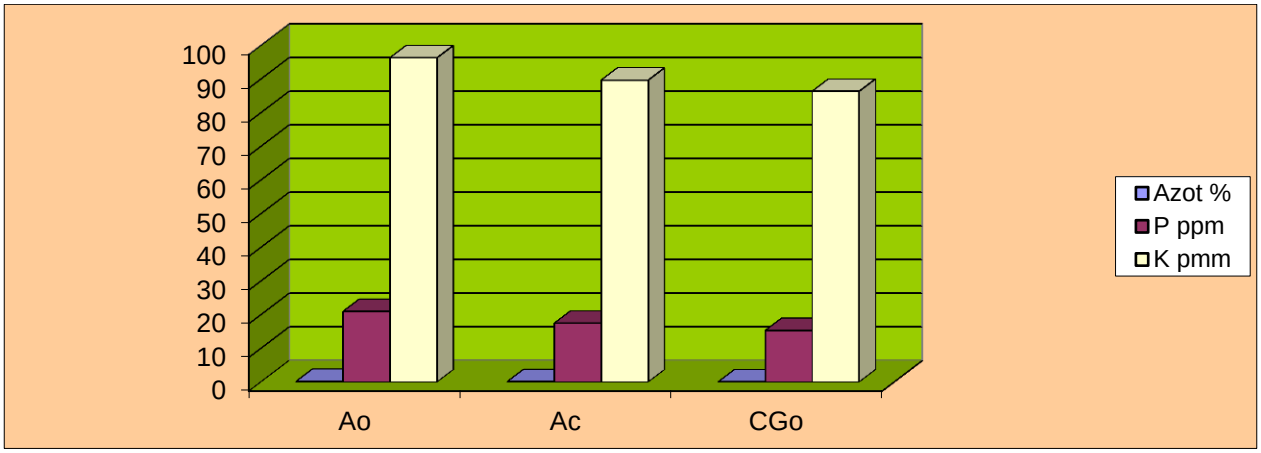


Figure 9. The nutrients content of gleysated colluvic alluvisoil

The sum of exchangeable bases increases with the depth from 24.6% me/100 g soil to 29.4 me/100 g soil. With the case of hydrolytical acidity there can be noticed a decrease with the depth, from 3.6 me/100 g soil in the first horizon to 2.7 me/100 g soil in CGo horizon. The bases saturation degree records increasing values on the soil profile, from 87% in the first horizon to 91% in CGo (figure 10).

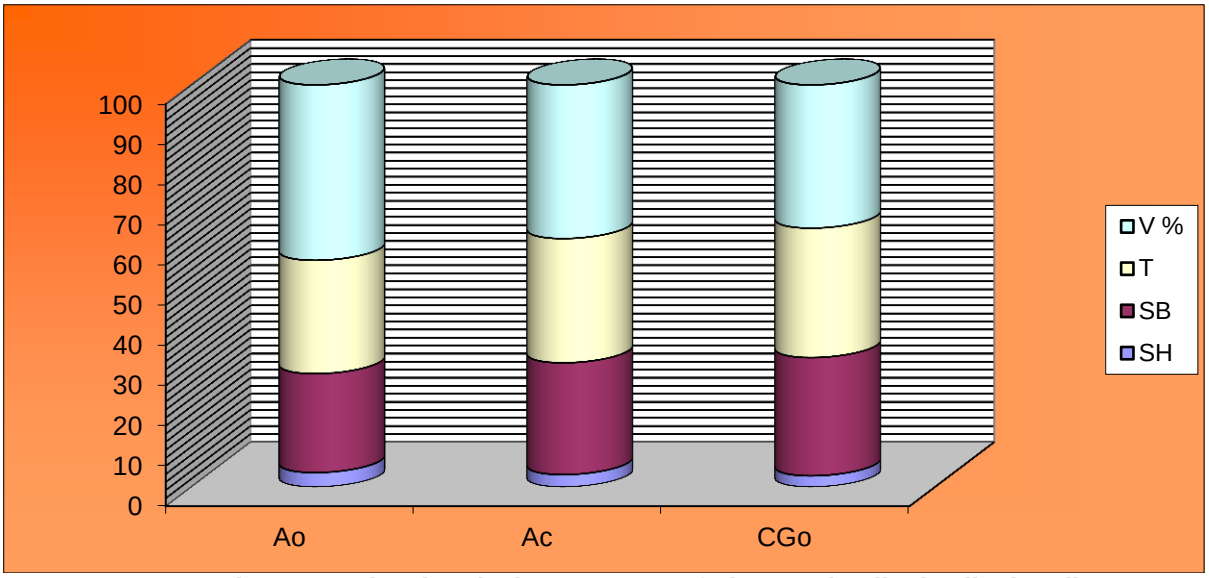


Figure 10. The chemical parameters of gleysated colluvic alluviosoil

After the establishing the bonitation marks and the suitability classes in natural conditions, for the soils of Vladaia locality, District Mehedinti, there can be noticed the folloing (table 1):

- the highest bonitation marks and favorability classes have been obtained by the reddish preluvisoil, followed by the gleysated colluvic alluviosoil and then by the luvic reddish preluvisoil and the lowest favorability classes and bonitation marks have been obtained by the eroded reddish preluvisoil;

The bonitation marks and the favorability classes with the soils from Vladaia locality, District Mehedinti

Table 1.

Crop	Reddish preluvisoil		Luvic reddish preluvisoil		Average eroded preluvisoil		Gleysated colluvic alluvisoil	
	NB	CF	NB	CF	NB	CF	NB	CF
Pastures	58	V	64	IV	46	VI	64	IV
Hay fields	40	VII	37	VII	25	VIII	63	IV
Apple tree	58	V	47	VI	40	VII	19	IX
Pear tree	51	V	47	VI	28	VIII	36	VII
Plum tree	46	VI	65	IV	41	VI	13	IX
Apricot tree	65	IV	40	VII	35	VII	18	IX
Cherry tree	52	V	31	VII	15	IX	18	IX
Peach tree	36	VII	18	IX	9	X	16	IX
Vine for wine	72	III	65	IV	45	VI	45	VI
Vine for table	46	VI	46	VI	23	VIII	36	VII
Winter wheat	58	V	58	V	35	VII	54	V
Barley	58	V	58	V	35	VII	54	V
Maize	47	VI	47	VI	21	VIII	57	V

Sunflower	47	VI	42	VIII	14	IX	51	V
Potato	41	VI	29	VII	7	X	43	VI
Sugar beet	45	VI	36	V	9	X	63	IV
Soybean	52	V	52	V	23	VIII	54	V
Peas, beans	51	V	58	V	29	VIII	63	IV
Flax for oil	45	VI	52	V	24	VIII	57	V
Flax	38	V	52	V	31	VII	63	IV
Hemp	45	VI	47	VI	24	VIII	57	V
Alpha-alpha	51	V	52	V	32	VII	36	VII
Clover	52	V	47	VI	33	VII	50	VI
Vegetables	45	VI	36	VII	13	IX	63	IV

As regard the crops, there can be emphasized the following:

For the reddish preluvisoil, the best results were obtained by: plum tree (BM=65; FC-IV); pastures (BM=64; FC-IV) and the lowest results were given by peach tree (BM=18; FC- IX) and potato (BM=29; FC-VIII).

The best suitable crops and the highest bonitation marks for the average eroded preluvisoil have been given by the following crops: pastures (BM=46; FC-IX); vine for wine (BM=45; FC-VI).

Good results have been given by the following crops: vine for wine (BM=72; FC-III) and apricot tree (BM=65; FC-IV) for the luvic reddish preluvisoil and low results have been given by flax (BM=38; FC-V) and peach tree (BM=36; FC-VII).

Making an analysis for the fourth soil type, the gleysated colluvic alluvisoil, there can be said the following:

- the highest bonitation marks and the best favorability classes have been obtained by: pastures (BM=64; FC-IV); hay fields (BM=63; FC-IV) and the lowest results by plum tree (BM=13; FC-IX) and peach tree (BM=16; FC-IX).

After establishing the bonitation marks and the favorability classes with the soils of Vladaia locality, District Mehedint, there resulted that the best conditions for plant growing are offered by the following ways of usage: vine for wine, winter wheat, barley, plum tree, maize, pastures and hay fields.

The worst results have been given by peach tree and potato. There are not improper crops.

CONCLUSIONS

The territory of Vladaia locality is located in the S-E part of Mehedinti District. Geomorphologically, it is located at the limit between Getic Piedmont and Danube terraces. Within its territory there are plateau, versants with different slopes and wide valleys of 50-150 m.

The territory belongs to the clime index C.f.a.x. after Koppen and from the vegetation zone of oak.

The surface erosion from versants has different intensities from low to excessive. Within the reference area there was identified the reddish preluvosoil as main soil type, with the following varieties: typical, eroded, luvic and on small surfaces, colluvic alluvisoil and gleysated alluvisoil.

The Vladaia locality, District Mehedinti has soils with an average and reduced fertility which need the following measures for improving their fertility:

- completion of nutrient deficiency by a rational fertility with organic and mineral fertilizers;
- proper soil management;
- lime amendment on acid soils;
- all technology works to be made on contour lines and terraces where possible;
- scarification on deep compacted zones;
- choosing the crops after favorability classes

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